generally speaking about today's music. So, since we are all in a music community, we can have a conversation which I hope could be useful for all of us. If you have some questions, some problems about modern music, about my music, please, it is the place to discuss it.

Marcus Erbe: Listening to *Shânti* for the very first time one might be tempted to characterize the predominant sounds as static and invariant. A closer inspection, however, reveals numerous internal fluctuations. Since you have told us that many sonic elements in your work are derived from human crowds and gatherings, I would like to know whether the aforesaid acoustic fluctuations result from such sources. Or are they due to completely different processes?

Jean-Claude Eloy: There are in fact different sounds with different sources and with different techniques of production. I talked about the 'slogan' sounds, which are only one source. But those sounds you are referring to, I suppose, are perhaps what I call 'meditation sounds'. Very deep. These are purely electronically generated. With some frequency modulation (the 4x Philips generators which were in use at this time at the WDR). Recorded one time, then recorded with some other transposition and other intermodulation on other tracks, and then piling these tracks one after the other, then mixing them together and piling again... It was a long process in the analog studio. It is most of the time generated from oscillators. And of course, the fluctuations you hear are because there are many frequencies. These blocks have a sort of permanent frequency fluctuation inside themselves. But you have to be pragmatic for that. Until now, I have not found a mathematical proportion or anything like that in order to obtain them. I have to try, to listen, to see and to appreciate. If I have good luck, I have that type of sound, then I think it would make good material for piling such type of sound. So I record it. And then, maybe later, when I pile some more tracks, there will be different techniques of mixing to get different results, different fluctuations. So it is quite pragmatic. But generally, with the practice, I can evaluate in advance what this type of sound will become, after many, many mixings, sometimes filterings. At the WDR, at this time, there was this famous "Albis" filter, which was useful for obtaining varied rich types of filterings: particularly with this nasal component that we were able to give, and which I used for those meditation sounds.

Volker Müller: It were these narrow irregularities and slight inaccuracies in the mechanical analog tape-procedures which caused that something happened during the process of 'filtering again and again' – additionally to the basic functions of the specially set up closed loops. Only few of these loops were closed tape loops for playing back a pre-recorded sound endlessly as loops usually are used for. Most of them were part of closed loops in a cybernetic sense. They were set up for recording and at the same time they were producing long delays. The delayed signals then were treated by various filters and fed back to the recording. By using the tape machines in such untypical manner the recording and playback quality was not as precise as was the standard with professional analog tape recorders in these old times. So – by the successive re-recording of the slightly deformed signals with similar un-precision more and more times – the sounds by and by were transformed just by the process itself.

Eloy: Yes, it happened with the inclusion of some aleatoric factors in tension of the tapes, the re-recording fidelity, etc.

Müller: I think we can look at this phenomenon from a special point of view. The many necessary re-recordings as basic part of realization inside the intended time related processes mean that – parallel to the transformation progressing – little mistakes must increase as well. So I think that the little irregularities in the sounding results which we could not get rid of might be looked at as a special quality of instrumental colour connected with the realization setups.

Eloy: Yes, I agree. There is a specific colour about *Shânti*, which is heard from the beginning of the piece and continues on. And this general colour is part of the identity of this work. Talking about *Shânti* there are many sources: there are concrete material sources, transformed concrete material sources which become new results, other sounds and which can then be used as new sources of a new process to be piled again, filtered again. Also there are electronic sources (purely electronic sources), and that of course can create those big blocks of frequencies about which we spoke already. And if you can listen for a long time to such blocks, it is because it is not static, as you said. It is static as a global entity. But inside, there are plenty of little things to listen to. And that is why you do not get tired of listening to it. You know, there is nothing more boring than to listen to a pure wave: a sinus.

I learned that a long time ago when listening and studying many of the 'learned non-western-musics'. That was a great experience! I had this experience a long time ago before entering the field of electronic music. I was so interested in non-western-music generally speaking – Indian music, Tibetan music, Persian music, all the Middle-Eastern musics, Chinese music, Japanese musics and particularly Indonesian musics, from Java and Bali, the whole area –, that I asked a laboratory in Paris to do research. I asked the Acoustic Laboratory of the Faculty of Sciences, Professor Emile Leipp and his assistant Miss Castelango, to study several records, mainly published by the UNESCO at this time. They made many sonograms of examples which I had selected. Because I thought: "There must be a secret in those musics, and the musicians have that secret for being able to keep the interest of listeners for so long. And furthermore, this happens with a type of music which is modal and non-modulating. There is hardly any polyphony like what we created in the history of European Music. They do not care about polyphony. They can handle the interest for hours by a simple melody. So, there must be something in the inner life of the sound, which is so interesting". So, I went to the laboratory in Paris, and from the sonograms they made, we could see something interesting. We made several slides out of them to project and see better. When we were looking at these sonograms, we could identify very easily their different origins. The singer of Indian Dhrupad is showing a lot of glissandi-portamenti between pitches, and the shape of the sound wave, when we enlarge it very much, has a characteristic graphic shape. Same with the Iranian and his tarir. You may see those incredible quick 'tremoli' at a regular interval. All of that was looking nearly like writing. The sonogram of the Persian voice is like Persian writing, in some of their miniatures. I remember also the Turkish Sufi. He is a solo singer who begins the Sufi ceremony. And it is fabulous to see on these sonograms how he controls the vibrato or non-vibrato. You see

that in the graphic of the melody. When he wants the sound to be flat, it is totally flat. Non-vibrato. If he wants one vibrato, he puts one. If he wants two vibrati, he puts two. Like a sort of ornamentation. They have also this very interesting old way of singing in India. They control the vibrato. In quantity, in length, in shape, in frequency space. The vibrato sometimes is quite quick and inside a small field. Then it becomes slower and louder, inside a broader field of intervals. From this, they can go to the glissando. And the glissando in that case, the portamento, is in fact only a modulation of the vibrato: an enlargement and consequence. It is totally integrated. Glissando, portamento and vibrato are only several dimensions of the same phenomenon. And they have control, total control of that. It is fabulous!

So, I remember, when doing this work, Professor Emile Leipp said to me that this is the secret of those musicians. A secret which we had a little bit forgotten in our civilization. Because we wanted a big polyphony. And in order to develop a big polyphony, we have been reducing the sound and notation to the pitch. And that pitch is becoming a fixed reference: a standard, very precise. And all the music becomes pitch music. We must reach an exact pitch, then jump to another exact pitch. And all the polyphony becomes the art of combining those jumpings from pitch to pitch. These investigations which I made at this laboratory were showing exactly the problem.

So we had a long discussion about that, because it is a civilization problem. Some specialists of Gregorian singing told me that Gregorian singing in the past was different. It was more ornamented, it was most probably richer in varied techniques of projection of the sound. Because these chants come originally from the Middle-East. So, at its origin, it must have had plenty of those portamenti and ornamentations and gruppetti inside the acoustic of the body of the sound – all that you find still, for example, in several types of folk music from the Balkans. And we agreed, when talking with Professor Leipp, that there was probably during the history of Western music a process of purification. We would be referring to a period, in the Middle Ages, when the church began to intervene on the way people were singing at the church, and asked for reforms so that people should sing a little bit more pure without all those ornamentations and glottal accents, etc. It was a sort of purification process. I am not a specialist for Gregorian history, but I can guess the idea is probably right: there was a puritanistic influence at one moment, which obliged the sound in the West to become 'cleaner'. Probably at the time of Pope Gregorius, who imposed his reform, and most probably it was a reform of puritanistic character. People were asked to sing pure pitches. No acoustical accidents. Exact pitch with no accident is pure. And the Angels are supposed to be pure. And they probably wouldn't be singing with all of these ornamentations which come from the Devil... And so, these days, when we hear Gregorian singing, it is very flat. It is like a pure wave. And as Professor Leipp told me: "There is nothing more boring than a sine wave!" And so, obviously, when you have a sine wave, the acoustic body is quickly suffering from a lack of renewal of information. In a few seconds you need to change the pitch, the frequency, in order to raise the interest of the listeners by providing new information. If you keep the same sound with a pure pitch, it is boring. So you combine a succession of pitches, and then you begin to combine pitches with pitches and you go on to polyphony and you go on to western civilization. So, this was his (and my!) analysis of the root of our music and our civilization.

I believe that these days, electro-acoustic, concrete music and all of that, is forcing Western civilization to rediscover the richness of sound, the richness of variations of vibrations. To rediscover the fact that there is not one single way to appreciate 'pure' and 'good' sound, but that there are many other ways. And I think it is a great revolution for us. To force our consciousness to integrate all the sounds of nature, all the sounds of civilization, including these from our daily life into a global concept of sound. To enlarge completely our perception of what we considered musical, 'can' be musical, 'could' be musical. And this revolution is very important. I remember in Tokyo, when I was working on my work *Gaku-no-Michi* at the NHK Electronic Studio, I went into the subways in order to record concrete material: doors, bells, etc. including the specific noise of certain moments when the train compartments are turning, and it produces a certain kind of sound on the rails. The passengers were looking at us, recording. And they were looking everywhere around: "What the hell are they recording so patiently?" For they could not imagine that we were recording the sound of the subway itself!

Auditorium: Why did you choose just these sounds?

Eloy: I happened to be invited by this studio from NHK in Tokyo and I wanted to have concrete material. I was going to explore the whole city and record all the sounds of the streets as part of the daily life of the city – a big city! And I manipulated these sounds in the studio later, in order to transform them. And so I went to the subways and many other places from the daily life: department stores, children's playgrounds, Ueno public park, etc.

Now, during that process of researching materials for the project of this work, I did ask a specific question to the Japanese people. I said : "What is Japanese sound?" Meaning: what are the most typical sounds, which could characterize Japan. Some of them answered: "A small little stream of running water." So, some weeks later, I came to the studio with recordings of water noises coming from different parts of the world: from France, from America, from Japan also. After making them listen to all of the examples, I asked: "Which one is Japanese?" They were so embarrassed!

Auditorium: Sometimes you make sounds from concrete to abstract, sometimes from abstract to concrete. Where do these sounds come from? I think it is a very interesting process of transformation and perhaps you have a philosophical intention, or you want to underline a social aspect?

Eloy: Yes, my interpretation of the world has always been grounded on philosophy which is dialectical philosophy. In pure philosophy, I like very much the pre-Socratic philosophers. Heraklitus for example is very interesting to me, because he stresses the dialectical and contradictory powers of the world, its circles and tensors of forces – force of harmony, force of destruction. You have all these forces in combat with each other. You cannot conceive of the world without this permanent tension and this permanent fight between different forces. Physical scientists of today are exploring those fights (contradictions of forces) on the stand of physical laws, underlined by an immense expansion of our capacities of observations, thanks to modern technologies. The universe they are unfolding, deeper and deeper everyday, is an immense conflictual type of universe, with forces swallowing

each other, destroying each other, transforming each other into some new entities and new forces. They discover that there are many values that transform themselves into other values. Places where light expands and moves at its own speed, while in other places light cannot move and remains a prisoner, like in black holes. So the universe shows us these very big tensions. It is not at all the universe of harmony, calm, fixity and pure abstraction and perfection that our ancestors were imagining, sometimes through the prisms of religious cosmologies. Once more, the only ones who conceived of a universe showing an image as close as what the science of today is discovering, are the Indians.

Shânti is very much founded on that contradiction. I took the Sanskrit and Hindi word Shânti, which means 'peace'. But at this time, in the 1970's, peace was not more established than it is today... So I used this word in another way. I wanted to confront the idea of peace with the idea of tensions, fight, battles (so the reason of the 'soldiers' at one moment), and the whole piece of *Shânti* (even as a work of pure complexity of sounds and music) may always be interpreted also on another level: socially, or spiritually. And if you want to feel the meaning of my work *Shânti*, the process has to be understood in this broader sense. For example, the slogans you may hear are transforming themselves, and when you reach a moment where they are elaborated by the output of the last circuit, you cannot recognize them. But you can still understand it is related with those slogans heard before even at one hour distance or more inside the whole construction. Of course, sometimes I like for us to understand where it comes from. It is useful to be connected sometimes with the original source of the material.

Christoph von Blumröder: Is your fascination for non-western musical elements motivated by an identification with eastern philosophy?

Eloy: At the time when I did *Shânti*, I was reading a lot of books. As far as India is concerned, I was reading Aurobindo. But I was not so interested in the most 'spiritual' aspects of these books – at this time.

In *Shânti*, I could integrate some elements of discussing and exchanging ideas. There are some quotations of Aurobindo, and there are some poems by Mao Tse-Tung. And there is a discussion about it... And we discuss about the 'abstraction' it is to... Well, it is quite obvious: you cannot speak about peace to people who have nothing to eat! So before speaking of peace, of spiritual peace, of social peace, you have to find ways to feed them, to care about their physical problems, illness, health and raising their children, offering them an education, etc. You have to give to them this minimum of quality of life without which one cannot have the 'luxury' of searching for one's spiritual blossoming.

That intercrossing of the two major themes (spirituality and social revolution) was not 'à la mode' for the discussions at this time, in the 1970s. Discussions between people who wanted to go only on spiritualism and people who wanted to go only on revolution (the social-economical revolution) were very rare and always ending up into discords, non-understanding and polemics! And in *Shânti*, there are both of these parts of the universe. I do not want to exclude one in front of the other. In fact, at this time, I did a little bit too much of Aurobindo's quotations. In the concert we hear tonight there is a little bit less of those words: I revised it. I prefer this version with fewer words and more concentration on sounds.

As far as non-western music is concerned: I do know, of course, that most of the classical non-western music is mostly grounded on religious functions and texts. But now, I can easily dissociate these two aspects when listening to non-western music. I can now dissociate the functional place of the music (what the words mean) from the music itself. Quite often, in Indian music, for example, they use syllables, not words. Syllables alone can become the ground for a much deeper spiritualist speculation than words. And because I am first a composer, I am only a musician, I can be interested in techniques of music, in a technical, practical and conceptual thinking of these types of music, without being obliged to carry on my shoulders all the sources where it comes from.

For example: I have been working with Buddhist monk singers in Japan. But I wanted to introduce them in 'my' music (let's say: a music conceived by a 'composer'). Working with them, I discovered (and they confirm to me with their explanations and our numerous friendly conversations), that as Buddhist monks singing (the act of singing itself, even simply on syllables) is something fundamentally Buddhist. And they accepted totally, without any reserve, to follow my instructions and get into my world of sounds. They themselves accepted that they could be musicians and that their techniques could be used (on condition of being correctly used! Not distorted...). As the techniques of singing, as the fact of singing are anyway considered as a part of their spiritual view of the world. They told me that they did not find any contradiction of being monks and performing new music: "If you like our voices, and if you believe that we sing and do it correctly for your music, then we do not feel there is a contradiction. But of course, your work is conceived in a way that we do feel and understand quite well. When we are singing it on stage, being surrounded by this wonderful electro-acoustic big world of sounds, percussion sounds, etc. we feel that there is a path, a way in this music, for spiritual content, and we are happy to sing it." They are very open-minded. More than the Gagaku performers. So we can be interested in non-western music without keeping all of the philosophy and functionality which generally comes with it: but of course, knowing it and respecting it from its roots! I would not take these monks for singing a cabaret song!

Erbe: Concerning the realisation of *Shânti* and *Erkos* you mentioned that the first work was produced with analog devices, whereas the latter is the result of adopting digital studio techniques. If I remember correctly, you marked the tools of production as beeing highly influential with regard to the respective compositional method. Which way of working do you prefer?

Eloy: Both! Because I precedingly only spoke about one aspect of *Erkos*. But in other parts of what I composed then – for example during the sampling period of preparing the work – I asked a friend whether he could come to the studio with a big metal-plate. A type of instrument called 'Unban'. And they all come from Japan. Fabulous instruments! Which are decorated on the metal. There are several designs (sometimes quite complex) made on the plate itself, providing the plate with many accidents, differences of surfaces, granulations, etc. So I went to the kitchen of the WDR studio and took several tools there: among them, a corkscrew, made of light metal, and an egg-beater, made also of many 'rays' of light metal. Striking and 'caressing' with these tools on the Unban plates – fully equipped with contact microphones – created wonderful complex metallic sounds! Concrete complex

sounds which ended later inside transforming circuits. Filtering, modulating, echoing, passing through the vocoder (again analog), etc. The recordings could be digital. Some transformation tools could be digital. But the source was concrete. So, there is a permanent melting of technologies found in that piece. And that creates the richness.

Also in *Shânti*, in the last part, there is a huge sound which is made out of quantities of glissandi sounds: slowly ascending massive parallel glissandi. It is made out of pure soundwaves produced on a group of Philips generators, with a modulation used as piloting the slow glissandi. Once a glissando is reaching the extreme of the spectrum (highest frequencies) it disappears and is replaced on our perception by a glissando coming up from the lowest frequencies and slowly ascending, at the same speed, with the same timbre, etc. So, those packs of successive similar glissandi, ascending, and permanently replaced by new packs of totally similar glissandi, are creating what I called then the 'infinite ascending sound', which I keep for several minutes during the last part of *Shânti*. Tonight, with the power and clarity of the 8 channel speakers that you have here, if I push the levels, it might be felt as a breathtaking moment. Of course, it is subsconciously understood – at this specific part of this long piece – as a sort of departing, of going out, of overpassing and transcending all the conflicts which *Shânti* and all its construction have been expressing for two hours.

All of this is to say that there are diverse techniques used in these pieces, and that the complexity and diversity of expression can come out only from the encounter of these diverse techniques.

Auditorium: What is the relationship between those different ways of expressing music: electro-acoustic music, music by an orchestra, by vocalists, by combinations. What is the importance of the different sound sources?

Eloy: This lecture is just an example of my activity as a composer. It is related to a concert which is scheduled tonight, and tonight we will hear an example of electro-acoustic music. So I did not want to illustrate this lecture with the same kind of example that we are going to listen to tonight. That is why I scheduled a lecture expanding on before *Shânti* and after *Shânti*, in order to show a certain development of the composer at different ages of his work. Anyway, I think that purely electro-acoustic music is one step, one moment, which will be continued of course, but it is not the exclusive solution of modern music. And the one of the possible roads that I propose consists of taking a live performer in the studio, sampling this performer and all its sound possibilities (preferably a 'creative' performer), and then develop and re-work at high levels this material through the possibilities of the studio: modulating, multiplying, transposing, transforming... It is a road which is used by many composers these days.

One of my dreams would be to use electro-acoustic music with a big ensemble. But the problem is that it really hurts the habits of productive structures, as they are set up by many organizations. Because most orchestras do not have electro-acoustic around them, they generally hate the idea of being obliged to conceive something with it. It is now still very difficult for the composer to get a big ensemble of instruments, together with a very elaborated electro-acoustic situation, and get all of this power working properly together. Otherwise I would be interested in confronting an orchestra with electro-acoustics. But that

would suppose a very intensive and quite big type of production, set up a long time in advance – for conceiving and working properly on the specific electronic parts – that most of the existing organizations are reluctant about or incapable of offering.

von Blumröder: We were talking about these relations between electro-acoustic means and the traditional performers. Have you already experimented, or are you interested in working with interactive systems – in the field of live-electronics?

Eloy: I am interested. But until now I could hardly obtain tools which are capable of producing complex enough results. I was in the United States a long time ago, and at this time, in the 1960s, most of what I heard was poor in sound making. Little sounds. Not very rich. And for me it is not the type of sound I like. The problem is to reach an interesting complexity of sound material and still to be able to control it: at least in its main aspects, even I accept certain limitations of control of small details and certain random fields.

As you can hear, I like the sounds with volume, granulation, complexity of texture, non-instrumental types of shapes and articulations, power, etc. which need either many musicians (many 'manipulators', if we use new tools and new instruments and have the will of complexity, like in traditional orchestras), or the time-delay, the duration, that we can master through the long process of studio working. If one is interested in the complexity of sound, until now, most of the live-electronics I have heard is often too feeble in complexity, richness of sounds and type of material. Furthermore, some pieces which I hear too often, grounded on flutes or pianos, or other very established instruments, are providing the shapes and articulations of flutes and pianos. In such cases, where is the 'new world' of electro-acoustics? But I do not refuse the idea of live-electronic music, and with the developments of power on portable computers, it might grow quickly.

I have many dreams... One of them, some years ago (and I attempted it) was to constitute an ensemble of people, using new electronic instruments. Even commercial synthesizers. I wanted to use my experience and knowledge as an electro-acoustic composer and also my practice as a pianist, as a composer for orchestra, etc. Having an ensemble with five, six or seven performers, each on rich ensemble of synthesizers. But the difficulties I met were both practical and financial. Tools are transforming permanently. We need to keep the 'habit' and 'user friendly' relationships with a fixed ground of tools. And if – after a certain period – they cannot be repaired and maintained, it creates practical difficulties. We need to find a certain standardization of material, and a long range of stability, in order to develop a true music making 'art', outside the usual 'research' productions, so much referred to as the only landmark in those fields.

Until now there have not been many possibilities to fix oneself onto a stable technology ground. There has been permanently the rush for new technologies. And that means: 1) an economy which can support it; 2) an immense time consuming (unproductive time!) for the composer and the performers (or the 'composer-performer') for permanently learning new tools and trying to master them.

Sometimes I envy the commercial composers. I read regularly several special magazines (like the American *Keyboard*, etc.), because in a certain domain, commercial music and industrial music are the true motors of the electronic industry in these days. We now have the benefit of a democratized computer industry, sound industry, synthesizer industry,

as a feedback of the market generating commercial music. That is why, when I hear some 'purist modern composers' keeping their ideologies on pure 'avant-garde research', I wonder whether they are conscious of their increasing dependence on the commercial market. In fact: if they want progress in democratic technology, they ought to thank the commercial composers for pushing that market. Otherwise, with only a market limited to what is called 'contemporary music' (unproperly and abusively called that term to my feeling), there would be a grave crisis on the pure technology evolution and application. So this is a very strange situation now, because until now – in France particularly – we have these few research centers for electro-acoustic music, paid for by the state. It is nice to 'search'. But it is also nice to 'find'. And this is becoming a social problem. Because, of course, the state-machine may accept a certain amount of investments for the future, but they are also just like all kinds of sponsors in the world: they want sometimes to hear and see some convincing results out of it! So, those research centers have difficulties now, because what they produce is not always a very visible result. So I believe, in the future, there will be a sort of curious melting of possibilities (an interesting melting) developing between the privileged research and few academics, and the vast democratic majority of users: including commercial, industrial, rock, techno, etc. And these last terms are not obliged to mean always an absence of creativity and capacities for art making.

It was the feeling I had in Grenoble two days ago, because in this festival (*38e Rugissant 2001*) they are focussing on modern technology and blending of cultures. And they do not hesitate to invite artists who are more or less improvisors, have direct or indirect ties with the rock scene, techno scene, etc. in all kinds of music in fact. They are creative. Yesterday they did a real-time live internet-concert between a percussionist in Grenoble and a group of percussionists in Johannesburg, in South Africa. And they had probably to set up an agreement with the Telecom company in order to have a high capacity direct line, with only a very small delay in milliseconds, so as to be able actually to do this live concert between Johannesburg and Grenoble.

This is opening also some cultural possibilities. Interaction on this planet through the internet live-concerts. We are concerned about those problems and I do not mind if it is carried out by some commercial technologies. Because this progress of technology is interesting for us and for the benefit of music.

von Blumröder: I would like to ask another question concerning research and the difficulty to find something musically new. If you compose electro-acoustic music, especially if you do it in an empiric way – listen to sounds and transform, then decide, take this, take that –, there is always the problem of the scientific side of view, the aspect of documentation of the work, and the problem of transparency. For instance concerning *Shânti*: how is the process of production documented? And do you see any possibilities for musicology to find a way to something like notation, that you did not know during your actual work?

Eloy: I understand fully your question and it is a vital question that I am asking more and more to myself. It is very difficult to comment on it now, because I see that in concert-tour, concert-management, concert-organization and in modern music musicology: all the modern literature transmitted is the one for orchestra, for soloists, for chamber ensembles, which is published by publishers, which is notated in notes that you can read. But only a

few people are analyzing the main electro-acoustic music production, because they do not know how to transmit the knowledge. Under which terms to express their analysis. I think there is a big problem.

This is one of the reasons, why I was shocked, when I heard, that the studio at the WDR was closing, and that they were doing nothing about the valorization and transmission of the whole work produced for decades by this studio. An engineer like Volker Müller had been working for about thirty years with all kinds of composers invited to the studio. He has seen different approaches by the composers. So he has huge practical knowledge. And I do not understand why the WDR did not create a new platform to transmit all his acquired knowledge to the young generation.

Müller: Remembering to have been involved in the realization process of a composition once is one thing – to transmit to other people personal knowledge concerning detailed features which once had been invented, elaborated and used during the production, is another thing – especially when they were realized and created in close contact with ideas concerning individual basic intentions of the composers. I am quite unsure, whether teaching such special solutions does make sense at all.

But there is another aspect of my profession which I think does make sense to influence a young generation with. My intention always was to give the composers the freedom to develop themselves and their ideas. Even when informing composers about basic possibilities the Electronic Music Studio of the WDR could offer, I always tried to find out what t h e y were looking for, what t h e y were expecting, what ideas t h e y were involved with. By preparing facilities for them they themselves could use alone and watching the developments of their working processes I mostly could imagine better, what they needed and how I could help them and so I could prepare new things for them – again a sort of time related process with positive feedback loop... Such processes need their own time. You know how many nights we have been working in order to find a good result...

Eloy: I think you are now rich in a very important experience, by yourself, and so for the other composers. And you know in depth how many diverse works have been made. I remember when, in 1990-91, we began to work around the old (but still wonderful) EMS vocoder. A lot of the sounds which I used in *Erkos* have specific acoustic identities and characteristics which come directly from that instrument and from the circuit which we slowly, step by step, developed out of it, with its different feedbacks through the console and so its different quasi simultaneous steps of transformations. There were a lot of feedbacks, I remember, because I love feedbacks. You know, it is my obsession since *Shânti*! I like loops and feedbacks. But in that case, there was a loop coming back in the vocoder several times and returning to the console and again at another point of the vocoder. This is a specific, unique sound, that you know how it has been made. And I am sure that if you could teach that experience concretely to people, it would open their minds to something very important, very concrete. So I am sad that the WDR did not have the idea to keep the possibility to transmit that knowledge.

But it is true – to come back to your question – that I am interested in the possibilities for notations to develop – even I am increasingly a great believer of oral transmission and new oral traditions. Stockhausen had the same problem. He spoke to me about GESANG

DER JÜNGLINGE. It was one of my first shocks about electronic music, when I was an adolescent myself (fortunately not in the fire!) and came for the first time to Darmstadt. I heard it here in the WDR concert hall. It made a big impression on me and I loved the piece at once. Stockhausen much later told me that he could not notate it fully. For some sounds and textures, he more or less forgot how he did them. He told me: "I could not do it again. I did it and we have to listen to the result. There are things which I remember, of course, globally, how they were made. But in full details, I could not reproduce knowing how they were exactly made".

Shânti is in the same situation for me. I could not do again *Shânti*. I would do a new piece in a new studio. It is impossible to produce *Shânti* again, because there are too many aleatoric factors and things, which come from that studio, from these tape recorders and their specific capacities of recording, and the whole setting of the tools in the studio, etc. So, I mean, the studio itself is an instrument, which vibrates and generates. All these tools are specific instruments, connected together, used in the same period. They interacted with each other in this specific studio. Including the cables, etc. And this studio, today, has vanished.

How can we transmit the aquired knowledge and experience? That is why we go back to the oral tradition. We are coming back to an oral type of period of music practices and this is how non-western music and practices are also capable, at this level, of teaching us something of an example. Because all the diverse civilizations of music have not always been transmitted with notation, with writing. Sometimes (and particularly since the second half of the 20th century and all its questioning of theory of music), the writing fact, in our western music – being used as the only means of communication in conservatories, in academies, sometimes more than listening! – has been leading to analysis and speculative abstraction which were pushed to such an extreme that it could and even did reach several kinds of absurdity! I think the writing can become dangerous, somehow. Because we see, more and more, the abstract aspect, proportion and meaning. And we forget the actual sound result and acoustic behavior. We take the notation as a true fact in itself. And it becomes progressively like a sort of filtering and dark curtain put in front of the sounds themselves. And we forget that the notation is just a code for memorization and reproduction. There exist some composers who do not play music themselves. They become very abstract. And their music sounds like that. And unfortunately it sounds ugly. At least for me. I do know that the criteria of appreciation for what is ugly and what is beautiful can be questioned eternally! But too often with such composers, one can hear that they have no concrete relationship with the practice of sound, with the making of sound. And this is very disturbing to me. Because, of course, I admit that a composer is before all a conceptor. But we do build things with sounds, and the least we can ask for such builders is to know concretely something about sounds. This is also what the electronic studio teaches. There is a physical involvement with the studio. Or at least there was a physical involvement in the great analog types of studios. We push, we have interfaces, and we feel it in the ear, and this is physical. It is not so abstract. I do something, and immediately I hear something. That was very attractive inside the approach and practice of the old studios. This is why I think electronic music must remain in touch with something concrete – the material, the physical. But to transmit analytically, or as musicology, such types of works remains extremely difficult. Besides listening and trying to remember the global techniques we used.

Of course, I could detail lots of circuits used in studios. Lots of operations made for pieces like *Shânti*, *Gaku-no-Michi*, *Yo-In*, *Anâhata*, *Erkos*... But as strict analysis, on a blackboard, I doubt it.

Well, of course, there are other composers who have a different approach. I have a very physical approach to electronics, very interactive, very pragmatic. This is my nature. But I also have composer friends who come in a studio with a full map. I don't know how they do that, but they do. Maybe Volker Müller has been working with composers like that, I do not know. There was one in Tokyo, who remained very famous among the technical team, because he came with a whole piece made on big paper. He knew not much about electro-acoustic sounds and electronic practices. So, on the first day in the studio, he asked for a table and a chair, installed himself at it, opened his big book, and said: "Well, this is my piece, and you have to do it". He did not touch a machine himself, did not touch anything directly in the studio. He gave them the map. But he had not the slightest idea of what sound would get in and what sound would come out... I find such an academic approach totally, completely absurd! Nothing can be more wrong than this. A map written down is just a map written down. Then, after that, the composer has to begin to compose and make the piece. And generally, sooner or later, a good composer is going to put all his map in the garbage during the process of composition, or he will keep just a sort of ghost or skeleton out of it.

Müller: I really would appreciate to have a good description, a critical description of the production processes of *Shanti* and *Erkos* – in a first step – for just remembering realization processes and then – in a second step – for possibly calling back intentions, discussions, ideas which had led to the used solutions. But I have learned that there are two totally different ways how composers are composing – putting things together – the one way as you just said comparable to a sculptor and the other way working similar to that of an architect planning things from scratch up to an elaborate score before starting to realize things. And these two different ways of thinking and working – these two different worlds – they have their own inherent qualities. And so they will need – and cause – various ways of analysis and documentation.

A good experience these days was when Gottfried Michael Koenig (one of the first young composers working in the WDR Electronic Music Studio in the early 1950s) came to Cologne again, played an old piece of his but as a total new version.[1] He had remade the piece! And that had been possible for he had constructed this work in that architectural manner, describing the acoustical results as parameters of defined sounds. It was fascinating for me and many other people to hear today, what he had invented 50 years ago. And which then was not possible to be realized in a pure way. So – I think – we should not laugh too much about the art of constructing music like architects when it is done with honest intentions combined with preceeded personal experience.

1 Siehe Gottfried Michael Koenig, *Seriell – elektronisch – digital*, in: *Komposition und Musikwissenschaft im Dialog III (1999–2001)*, hrsg. von I. Misch und Chr. von Blumröder, = Signale aus Köln. Beiträge zur Musik der Zeit, Bd. 6, Münster 2003, S. 102f.

Constructing things directly is one way of thinking, the other way is of keeping experiences and going forward step by step like someone who knows the goal from the beginning. But the results can be as perfect in both ways.

Eloy: You probably refer to that score by Gottfried Michael Koenig which is written with a precise notation in frequencies, in mathematic relationships, etc. So it is perfectly legitimate to proceed that way, for that type of thinking. I try to see it that way. One is obsessed with what one is dreaming of and is trying an approach which is imperfect because of the limitations of the tools at that moment. Then later he knows that the tools are getting better for rendering his original thinking and finally confronts himself with the better possibilities of realization.

Müller: But for instance, Stockhausen does not like the new version of that piece. He told me once that he does not like it. According to him the old instrumental colours of the early technical process belong to the piece.

Eloy: That is why I do not insist too much, as far as notation of electro-acoustic music is concerned. I am glad that after working in many studios in the world, I lost a lot of illusions in such fields. Even when I look at a score like the one Karlheinz did at the NHK-studio: TELEMUSIK, which I like very much as a music and aesthetic accomplished piece. Several technicians told me that they do not believe that, with this score (the one published at Universal) they would be able to realize correctly that piece again, to get exactly the same piece as a result. They told me they could make a 'silhouette' of the piece, a sort of remake of the piece. But not exactly that same piece. Which is quite contradictory with the common popular idea that electronic music is like exact sciences.

But after all, this could be a new metamorphosis of the old problem of music interpretation. I believe we are bound by big unresolved problems, and for quite a while. And because of that situation, there are a lot of pieces that belong to modern literature, which have difficulties to be transmitted in the traditional way. And my point of view is that we are going to continue to come up against these problems because we try to resolve them by imposing on electro-acoustics a set of criteria which belongs to the past world: the world of 'writing' music. Pure lecture and words like what we are doing now are just for general ideas. But it is not enough, because what we are going to listen to tonight is the final product. And to transmit would suppose to reveal secrets of the whole process. And that is something which can be transmitted only if we do it and experience it all together. So that is the only way again for that transmission, from master to student, from the 'maitre artisan' – in the old time the one who makes shoes or plates with one's own hands – to the 'apprenti'. Maybe we have to go back again to some older ways of teaching, which was a direct transmission from someone who knows how to fabricate something, and the young person who was watching and imitating. And only then, there was a transmission of knowledge. Like it was and still is in some parts of Asia. Again: 'oral' communication.

Müller: Perhaps I have some ideas. It was very kind to say that I was your teacher. But I believe you do not remember that I was a newcomer in this Studio for Electronic Music as well. *Shanti* was the third piece I ever did with a composer. My first working period was

with Ladislav Kupkovič. He was a newcomer as I was. None of us ever had been involved with making electronic music before. Both of us were in that studio for the first time. The second composer was York Höller. He at least had been learning theoretically a lot about procedures of producing electronic sounds with the old technical equipment available at that time by studying for instance the realization score of Stockhausens KONTAKTE. What I could bring into the work with you were other aspects.

First – basic profound knowledge independent from making electronic music which I had gathered during my education as a sound engineer and by my former working in various departments at the WDR.

Second – a sort of natural creativity and imagination as source for having fun with inventing, constructing and developing new ideas from understanding old possibilities. It is a very important thing and a natural way of thinking that we try to find out. I can remember that very often something seemed to be wrong in the studio – I told this to you – but I understood it had perhaps to be that way when it caused results interesting for you. And then I did not care for whether something was right or wrong or professional or not. Today with all the new tools made for special purposes, computer programs. I think we are in a similar situation. We have to deal with their basic ideas to become able for trying them in different personal ways.

Third – for me working with you and for *Shânti* was an important step. During this working period I always had a free communicative feeling inside which your imaginations often were triggering unconscious knowledge from my studying period – for example about psychoacoustics, how people perceive processes, etc. – That free interactive communication enabled me to create new setups and solutions for you by combining existing ideas and knowledge with the available technical realization possibilities of the studio. Thank you.

I think we should encourage young composers finding out their own way, and not follow the ways which have been already prospected. It is the result of my experience of about 30 years, that a studio situation in which a composer can feel free to experiment, all his attempts trying to find out what is inside the machines and carefully listening to the results when changing elements or parameters finally will lead him to the discovery of new possibilities with personal character. And this will fit more in a personal ideal. It is not so important to write everything down, it is more important to encourage people to find their own way.

Eloy: And this is what a good composition teacher would say. Messiaen said something like that: "Do not copy my polymodal system: do your own thing". This is what he said to Xenakis and others. To encourage some young persons to follow their own way.

Nevertheless, to come back to that notation problem, after *Shânti*, I understood that I had most of it in my head as a memory of how it was made, but nothing more precise. And since that period, I took on the habit of going to studios with books and pens! I wrote down everything I could write. All day, all the operations we did, including thorough measurements of the frequency-generators, writing down the voltages, etc. It was very often stopping and slowing down the creative process. But nevertheless I kept on that road. For all my pieces I have piles of books and a library full of such notes. Thousands and thousands of pages! But of course, it is very difficult to transcribe, because its notation is quite quickly written. I am incapable of evaluating now what will be the amount of interest in such pa-

pers. But nevertheless, I made some effort to notate something. Of course, now, with computers, we have a certain facility: we can find again the exact tuning of a parameter or its precise setting; memories can be automatically called, fixing or delivering piles of information. It is certainly helpful.

But on the other hand, the danger of some of the good developed software that we have these days is that some of them are really 'square'. They are made for being efficient for only certain types of music. You can have a developed software which is only made for one type of sound, or one type of music, and if you want to escape that type of sound or music, it is hell to obtain something else out of it! Because it is made for that, it is just that, and you are prisoner of that.

At the begining of the 1970s, when I came to the WDR studio and Volker Müller was there, the atmosphere was extremely free, because there was no highly standardized adapted technology. That technology was an extremely manipulation-technology type, with hands on. Anyway, none of these tools had ever been built for music making! And there were no established ideas. So, no desire for teaching and preaching which way it ought to be. It was still quite new: so everyone could be searching one's own way. And I like how it was at this moment, because it was very often adventurous. No one was imposing some established habits, or saying that I have to learn this and that, before doing that or this.

Of course, now, we have many more years of electronic music. There is already a sort of seed of history. The problem for younger generations is: "We cannot redo the same anymore, and there is already a past. Either we forget about it and we try to do something else. Or we try to assimilate this past and learn something from it". Most of the young people want to learn a little bit of the past and have a minimum of it transmitted to them. We always situate ourselves in relation with the recent past. So, if there is no possibility of easily transmitting that, then there will be some kind of difficulties.

Müller: I think there is some basic knowledge that is worth being transmitted. And it does make sense studying pieces which have been created in former times. That will at least deliver the chance to find out something about the quality of the own works.

Transmitting knowledge concerning technical realization processes, for instance how to produce a special sound yet existing in a piece, does not make too much sense alone. Teaching that way leads to a wrong understanding of electronic music. Sounds are not the music. They exist inside a composition, at a special moment, in an environment with other sounds, occurring suddenly or announced, as part of a scale, etc. They need to be understood in their connection to the musical construction and ideas of the individual composition they belong to. And when they were created not in that architect-like way of construction but in a more improvised intuitive process, then the history of that moment belongs to them – how can we transmit the process of the composers decision to make it this and his way...

Eloy: It is the same problem for classical analysis of a symphonic piece. You can analyze the processes, the technique and nevertheless not communicate the rest, which is the idea of the piece, and why it had to be that way. All analysis has this type of problem of transmitting the fundamental ideas of something, and not only the process and technology. Nevertheless there is something I would like to say, because we have been speaking of electro-

acoustic music in the way I have been doing it: from concrete sources, or big block sources, outside the pure (controlled) frequency domain – much outside the traditional instrumental frequency domain of the western music.

I think we are arriving now at the beginning of a new period. Because, well, you heard about the well-tempered scale. Personally I am fed-up with the well-tempered scale. When I go to Tokyo, where I could hope to hear something else than permanent western scales, I hear all around only music with tempered scales, and all of its tonal harmony. And if I go to a modern music concert, even if it is atonal music or something that way: again I find myself in front of flutes and pianos 'well-tuned' in the western way. And nevertheless, they could have so much music in their country, with other scales, other tunings, other instruments.

Recent electronic technologies in popular music allow more and more possibilities for micro-tonal scales. It comes also from the market and large calls for such instruments from the Middle-East, where they still keep in touch with their traditional scales and the world of quarter-tones and such micro-intervals, but want to have modern instruments for some popular concerts. There is more and more an accessible development of the microtonal worlds. Microtonalities, microtunings: you can create them in the synthesizers. Sometimes they are pre-programmed, with not only the obliged well-tempered scale, but with other temperaments, and even quarter tone scales. Furthermore, you can tune the microtunings and scales cent by cent, very precisely. And it stays in memories and cannot move. You may call any scale, at any time. It is the first time in the history of music that we have this absolute control of the frequency domain, just at our fingertips. Until now, when a composer wanted to escape from the tempered scale, it was a whole process and work. For example: the quarter tone harps in *Pli selon pli* by Boulez. To tune the two harps is quite a lot of work. The result is nevertheless beautiful and worth the effort! The harps are melting wonderfully with celli quarter tones and some metallic percussions. But you have to find an orchestra from which administration and artistic directors understand the need for this special supplementary work. And orchestra members accepting the supplementary work without calling for a strike. It is not easy. It is in fact quite a big social problem. But now, with modern instruments, this problem is technically resolved. I mean, with computers and synthesizers from the commercial market, I have a little program working on my small Mac which can produce – just with MIDI – a hundred micro-tuned scales! I know a classical Moroccan singer who lives in Paris ('classical' means: traditional Moroccan music with Arabic traditional scales). I asked her to come, and she listened, and I taught her some Arabic scales that she had never heard before, because some of them are realized out of Farabi: one of the Arabic theorists of music. And it is purely mathematics. It could never be realized practically with acoustic instruments. Only a computer can actually realize such precise tuning. So, it means that we are at the root of a revolution in which micro-intervals or all kinds of spaces, tuning, and intervals – macro and micro – can be controlled with the touch of a finger, can be programmed. So, I believe in the future there is a freedom of creativity and research again for the field of 'frequency music'. Complex frequency music outside of the well-tempered scale. The well-tempered scale is an absurdity these days, because it has been invented for tonal music, with Bach and the *Wohltemperierte Klavier*. It was invented to help the system of transposition which tonal music needed. So, tonal music is finished, the history of tonal music has been finished for one century, since we have been

passing through atonal music, dodecaphony, serial music, inside which a well-tempered scale has no signification, theoretically speaking. So, there is a huge area of atonal music which is performed these days, written for symphony orchestras, which has no great signification, 'acoustically' speaking. It is absurd. It comes from the past. From traditions which had full meaning centuries ago! I do not blame my composer friends who compose an orchestral piece with the well-tempered scale. I did it myself and could do it again. Life is short. And the aesthetical value of creation can rely on other aspects. Nevertheless, I do know that it is historically the past. There is no deep meaning to continue to produce music in that way.

And I further think of the public, even the general public, who does not know much about music, but listens to it. I always hear complaints that there is not a wide enough audience who likes contemporary music. I think they fear it, because there is something which perhaps they feel and which makes them unconsciously uncomfortable. And then, you have all these young people and masses of large audiences who go to listen to an Indian traditional singer, or an Arabic traditional singer. And they feel it is okay, even if they are no more an expert than for listening to contemporary music. What they feel unconsciously is that the Indian singer, the Arabic singer, the Iranian singer is logical with his music. They instinctively feel that there is a total harmony between the types of music which they hear and the frequency scales which are used.

So, I think in the future it is a very interesting situation to work with the possibilities that new synthesizers are offering, which are hardly used these days. Some commercial composers are aware of that and they already quite often use a natural scale. But that is all. It is not enough. So, I believe, in the future, if we want to go back to research and a significant and creative work in frequency music, we have to deal with that problem of microtonality. All kinds of intervals. And the technology of today renders it possible and it is a huge field of investigation. Because we could imagine a micromodal music with just one single mode, and we could imagine also a polymodal situation. Messiaen – at the end of *Technique de mon langage musical* – writes (I quote from memory, not with the exact words, but the meaning is correct): "With my polymodal language, I have explored all the mathematical possible combinations of the well-tempered scale. I am the last harmony composer. If there must be a progress of harmony, then it will be in the world of quarter tones". Well, the idea of what he called quarter tones at this moment, is what we call today microtuning. In fact, when he wrote, in his treatise, 'quarter tones', I am sure he meant all kinds of micro-intervals and micro-combinations of frequencies. So, today it is possible. I thank you for your attention.

Transkription: Anne Kersting und Tobias Hünermann

Shânti for electronic and concrete sounds
(Digital revised version 2001)

(around 19h40')

Before part I: sound of introduction (*Kâma-Shânti*)

I Partie d'ouverture: (around 20h00')
- *Les foules de la mémoire* (env. 27')
- *Son de méditation* (env. 2'-> 5'-> 20')

II Partie d'extension:
- *Prémonitions* (env. 21')
- *Flash-back* (env. 8')
- *Interview* (Aurobindo – Mao) (env. 9')

III Partie centrale: (around 21h10')
- *Mantra des étoiles* (env. 32')
- *Soldats* (env. 3')

IV Partie finale:
- *Vagues lentes, boucles de feux* (env. 6')
- *Contemplation aux enfants* (env. 15')
- *Vastitude* (env. 18')

(around 22h25')

After part IV: prolongation sound (*Kâma-Shânti*)

(around 22h45')